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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/689,488	10/12/2000	Kevin Frank Smith	SJ00-00-044	7862

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EXAMINER
LI, ZHUO H

ART UNIT	PAPER NUMBER
2186	10

DATE MAILED: 04/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/689,488	Applicant(s) SMITH, KEVIN FRANK	
	Examiner Zhou H. Li	Art Unit 2186	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 February 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,7,8 and 11-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *20* is/are allowed.

6)☒ Claim(s) *1-4,7,8,11-19 and 21-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

2. Claims 1-2, 15-19, 21 and 28-32 are rejected under 35 U.S.C. 102(e) as being anticipated by Weinberger et al. (US PAT. 6,453,389 hereinafter Weinberger).

Regarding claim 1, Weinberger discloses a method for pre-fetching data into a cache of a data storage system comprising remotely modeling dynamic operation of the cache (abstract and col. 2 lines 20-47), the remotely modeling including providing a model of data element stored within the cache (col. 5 lines 1-5) and making a cache management decision based upon the model (col. 5 lines 42-63).

Regarding claim 2, Weinberger teaches a prefetcher (16, figure 1) to intercept a request for a data element from a stream of input/output data request passed a host (12, figure 1) and a storage device (24, figure 1), and to determine whether to schedule a prefetch of a data element logically successive to the requested data element in accordance with contents of the cache as indicated by the model (col. 5 line 53 through col. 6 line 25).

Regarding claims 15-18, Weinberger teaches to recursively reevaluate the performance of the cache model comprising the steps of determining whether the dynamic threshold used in the internal model of the cache accurately models the performance of the cache by comparing the performance of the dynamic threshold with an alternate dynamic threshold (col. 7 lines 16-60).

Regarding claim 19, Weinberger teaches to schedule a prefetch by sending an I/O request to the cache (col. 5 liens 45-46).

Regarding claim 21, Weinberger discloses a data prefetching scheduling system as shown in figure 1 comprising a cache (14) configured to communicated with a host (12), a remote prefetch module (16) configured to communicate with the host and the cache and configured to schedule a prefetch data into the cache, and a modeling module (18) operating within the remote prefetch module configured to model the cache (abstract and col. 5 lines 1-63).

Regarding claim 28, the limitations of the claim are rejected as the same reasons set forth in claim 19.

Regarding claim 29, Weinberger discloses a prefetch module (16) as shown in figure 1 for determining whether to schedule a prefetch of data into a cache (14) in a computer system comprising a modeling module (18) configured to model dynamic operation of the cache in order to provide a model of data elements stored within the cache and a calculation module (17)

configured to make a cache management decision based upon the model (abstract and col. 4 line 40 through col. 6 line 65).

Regarding claim 30, the limitations of the claim are rejected as the same reasons set forth in claim 29.

Regarding claim 31, the limitations of the claim are rejected as the same reasons set forth in claim 1.

Regarding claim 32, the limitations of the claim are rejected as the same reasons set forth in claim 21.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 3-4 and 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weinberger et al. (US PAT. 6,453,389 hereinafter Weinberger) in view of Tipley et al. (US PAT. 5,325,504 hereinafter Tipley).

Regarding claims 3-4, Weinberger differs from the claimed invention in not specifically teaching that the cache is least recently used cache or native LRU-only cache which is not substantially modified. However, it is notoriously well known in the art of using least recently used cache native LRU-only cache in order to properly reshuffle a replacement order based on

read hits to a particular way, for example see Tipley (col. 2 lines 34-47 and col. 7 lines 51-65). By using least recently used cache or native LRU-only cache as taught by Tipley, it increases system efficiency of Weinberger by overwriting or recycling an oldest least recently used memory location in sequence. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Weinbeger in using least recently used cache or native LRU-only cache because of increasing system efficiency.

Regarding claims 22-23, the limitations of the claims are rejected as the same reasons set forth in claims 3-4.

5. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Weinberger et al. (US PAT. 6,453,389 hereinafter Weinberger) in view of Kurokawa et al. (JP 04-367984).

Regarding claim 7, Weinberger teaches to determine the size of the cache (col. 12 lines 33-41). Weinberger differs from the claimed invention in not specifically teaching to periodically fetching an I/O rate of the cache and periodically fetching a hit rate of the cache. However, Kurokawa teaches a cache control unit for periodically fetching an I/O rate of the cache and a hit rate of the cache in order to facilitate the development of a program whose cache hit ratio is high. By periodically fetching the I/O rate and the hit rate of the cache as taught by Kurokawa, it increases the cache-hit ratio. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Weinberger in periodically fetching an I/O rate of the cache and periodically fetching a hit rate of the cache, as per teaching of Kurokawa, because it increases the cache hit-ratio.

6. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Weinberger et al. (US PAT. 6,453,389 hereinafter Weinberger) in view of McNutt et al. (US PAT. 5,606,688 hereinafter McNutt).

Regarding claim 8, Weinberger differs from the claimed invention in not specifically teaching to periodically calculating a single reference residency time (SRRT) for a data element within the cache. However, it is notoriously well known in the art of periodically calculating a single reference residency time (SRRT) for a data element within the cache in order to optimize the efficiency with a cache controller for maintaining useful data in the cache, for example see McNutt (abstract, col. 10 lines 52-65 and col.11 lines 41-45). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to Weinberger in periodically calculating a single reference residency time (SRRT) for a data element within the cache, as per teaching of McNutt, because it optimizes the efficiency with the cache controller for maintaining useful data in the cache.

7. Claims 11-14 and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weinberger et al. (US PAT. 6,453,389 hereinafter Weinberger) in view of Dixion et al. (US PAT. 4,490,782 hereinafter Dixion).

Regarding claims 11-14, Weinberger differs from the claimed invention in not specifically teaching to assign a priority value to the requested data command comprising the priority value assigned to the preceding data element plus one when the preceding data element is found to be present, and to determine whether to schedule a prefetch of a data element by comparing the priority value of the requested element with a dynamic threshold so that the

requested data element is prefetched into the cache if the priority value of the requested data element is greater than the dynamic threshold. However, Dixion teaches cache system with prefetch determined by requested record's position within data block comprising the steps of assigning a priority position to a requested data element in order to determine whether to schedule a prefetch of a data element by comparing the priority value of the requested with dynamic threshold and prefetching the requested data element when the priority value is greater than the dynamic threshold (col. 15 line 46 through col. 18 line 59). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Weinberger in assigning the priority value to the requested data command comprising the priority value assigned to the preceding data element plus one when the preceding data element is found to be present, and to determine whether to schedule the prefetch of the data element by comparing the priority value of the requested element with a dynamic threshold, as per teaching of Dixion, because it provides a data processor with substantially increased operating speed.

Regarding claims 25-27, the limitations of the claims are rejected as the same reasons set forth in claims 11-14.

Allowable Subject Matter

8. Claim 20 is allowed.

Response to Arguments

9. Applicant's arguments filed 2/11/2003 (paper no. 9) have been fully considered but they are not persuasive.

In response to applicant's argument that Weinberger does not remote modeling of the dynamic operation of a cache, it appears that Weinberger clearly discloses the remotely modeling to implement a prefetch method including building a dynamic data structure (col. 2 lines 20-47) so that it recognizes the remotely modeling dynamic operation of the cache including providing a model of data elements stored within the cache. In addition, the claimed language fails to clearly define or explain remotely modeling the dynamic operation. Thus, the broad claimed limitation is met by Weinberger.

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

11. Any response to this final action should be mailed to:

BOX AF

Commissioner of Patents and Trademarks

Washington, D.C. 20231

Or faxed to:

(703) 308-6606

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Fourth Floor (Receptionist).

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zhuo H. Li whose telephone number is 703-305-3846. The examiner can normally be reached on Tuesday to Friday from 9:30 a.m. to 7:00 p.m. The examiner can also be reached on alternate Monday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Kim, can be reached on (703) 305-3821.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Zhuo H. Li

Art Unit 2186

MATTHEW KIM
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100